The Federal Networking and Information Technology Research and Development (NITRD) Program and the President's Information Technology Advisory Committee (PITAC)

Briefing to the President's Council of Advisors on Science and Technology (PCAST)

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Presentation Outline

- President's Information Technology Advisory Committee (PITAC) Overview
- Overview of the Federal Networking and Information Technology Research and Development (NITRD) Program
- Introduction to the NITRD National Coordination Office
- Recent NITRD Program Policy and Planning Activities
- Discussion
- Back-Up Slides

President's Information Technology Advisory Committee (PITAC) Overview

Legislative Basis for PITAC

- **High-Performance Computing Act of 1991 (P.L. 102-194)**
  - Authorizes the President to establish an advisory committee on high performance computing
  - The committee is to provide the Director of OSTP with an independent assessment of:
    - Progress made in implementing the High Performance Computing (now NITRD) Program
    - The need to revise the Program
    - The balance between the components of the Program
    - Whether the Program's R&D helps maintain U.S. leadership in computing technology
- **Next Generation Internet Research Act of 1998 (P.L. 105-305)**
  - Assess the Next Generation Internet program, including such issues as geographical penalties, the adequacy of Internet access by disadvantaged and small colleges and universities, and technology transfer, through reports in 1998 through 2000

PITAC Membership

- **Excerpt from September 2005 OSTP press release on PCAST/PITAC:**
  - The duties that the PCAST will assume as the President's advisory committee on IT include providing an independent assessment of progress made in implementing the NITRD Program and whether the research and development undertaken within the NITRD Program is helping to maintain United States leadership in information technologies and their applications.
- **By Executive Order, assignment of PITAC functions to PCAST was accompanied by increase in maximum number of PCAST members**

The 1997-2001 PITAC: Reports

- **Information Technology Research: Investing in Our Future**
  - Released February 1999
  - Major review of the Federal investment in IT R&D
    - Described the Government's essential role in funding R&D in IT R&D
    - Made findings and recommendations
    - Identified priorities for research

The 1997-2001 PITAC: Reports

- **Information Technology Research: Investing in Our Future**
- **Findings and recommendations**
  - Federal IT R&D investment is inadequate
  - Federal IT R&D is too heavily focused on near-term problems
  - Create a strategic initiative in long-term IT R&D
- **Recommendations of priorities for research**
  - Software
  - Scalable information infrastructure
  - High end computing
  - Socioeconomic impact
  - Management and implementation of Federal IT research
- **Report had substantial technical and structural impact on the NITRD Program**

The 1997-2001 PITAC: Reports

- **PITAC Reports Prepared by PITAC Panels**
  - *Transforming Access to Government Through Information Technology* (September 2000)
  - *Developing Open Source Software to Advance High End Computing* (October 2000)
  - *Transforming Health Care Through Information Technology* (February 2001)
  - *Using Information Technology to Transform the Way We Learn* (February 2001)
  - *Digital Libraries: Universal Access to Human Knowledge* (February 2001)
- **PITAC Conference Report**
  - *Resolving the Digital Divide: Information, Access, and Opportunity* (February 2000)

The 2003-2005 PITAC: Reports

- **PITAC Reports Prepared by PITAC Subcommittees**
  - *Revolutionizing Health Care Through Information Technology* (June 2004)
  - *Cyber Security: A Crisis of Prioritization* (February 2005)
  - *Computational Science: Ensuring America's Competitiveness* (June 2005)

Overview of the Federal Networking and Information Technology Research and Development (NITRD) Program

Legislative Basis for the NITRD Program (1/2)

- **Congressional Authorization of the NITRD Program**
  - High-Performance Computing Act of 1991
  - Next Generation Internet Research Act of 1998
- **1991 Act requires that the Administration**
  - Implement a National High-Performance Computing Program that shall:
    - Establish goals and priorities for high performance computing research, development, networking, and other activities
    - Provide for interagency coordination for Federal activities undertaken pursuant to the program
  - Submit to Congress an annual supplement to the President's Budget that describes the activities, plans, and NITRD budgets of the participating agencies by NITRD program component areas, and that includes an analysis of the progress made toward achieving the Program's goals and priorities

Legislative Basis for the NITRD Program (2/2)

- **1991 Act requires that the Program shall provide for:**
  - Establishment of policies for network management, access, oversight, evolution, and connectivity by Federal agencies
  - Efforts to increase software availability, productivity, capability, portability, and reliability
  - Improved dissemination of Federal agency data and electronic information
  - Acceleration of the development of high-performance computing systems, subsystems, and associated software
  - R&D of high-performance computing software and hardware to address Grand Challenges
  - Undergraduate and graduate education and training
  - Security requirements, policies, and standards to protect Federal IT resources

NITRD Program Goals

- Assure continued U.S. leadership in computing, information, and communications technologies to meet Federal goals and to support U.S. 21st century academic, industrial, and government interests
- Accelerate deployment of advanced and experimental information technologies to maintain world leadership in science, engineering, and mathematics; improve the quality of life; promote long-term economic growth; increase lifelong learning; protect the environment; harness information technology; and enhance national security
- Advance U.S. productivity and industrial competitiveness through long-term scientific and engineering research in computing, information, and communications technologies

NITRD Member Agencies

- Agency for Healthcare Research and Quality (AHRQ)
- Defense Advanced Research Projects Agency (DARPA)
- Department of Energy/National Nuclear Security Administration (DOE/NNSA)
- Department of Energy/Office of Science (DOE/SC)
- Environmental Protection Agency (EPA)
- National Aeronautics and Space Administration (NASA)
- National Institutes of Health (NIH)
- National Institute of Standards and Technology (NIST)
- National Oceanic and Atmospheric Administration (NOAA)
- National Security Agency (NSA)
- National Science Foundation (NSF)
- Office of the Secretary of Defense (OSD)

NITRD Participating Agencies

- Air Force Research Laboratory (AFRL)
- Central Intelligence Agency (CIA)
- Department of Homeland Security (DHS)
- Department of Justice (DOJ)
- Department of State (DOS)
- Department of Transportation (DOT)
- Department of the Treasury (Treas)
- Federal Aviation Administration (FAA)
- Food and Drug Administration (FDA)
- General Services Administration (GSA)
- National Archives and Records Administration (NARA)
- Office of Naval Research (ONR)
- Technical Support Working Group (TSWG)
- United States Geological Survey (USGS)

NITRD Subcommittee (1/2)

- **Chartered under the National Science and Technology Council (NSTC) to:**
  - Coordinate NITRD Program planning, budgeting, implementation, and reviews, including coordinating plans and budgets with the Office of Science and Technology Policy (OSTP) and the Office of Management and Budget (OMB)
  - Interact with stakeholders (government and non-government)
  - Coordinate responses to recommendations by PITAC or other Federal advisory bodies
  - Coordinate with other NSTC subcommittees
  - Guide the preparation of the Supplement to the President's Budget for the NITRD Program and other information pursuant to statute on behalf of the Program
  - Hold regular meetings to accomplish technical and budget planning and reviews
  - Maintain and oversee interagency working groups and coordinating groups

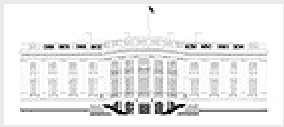
NITRD Subcommittee (2/2)

- Subcommittee members are representatives from each of the member agencies, OSTP, OMB, and the National Coordination Office (NCO) for NITRD
- Subcommittee participants include Co-Chairs of the two Interagency Working Groups (IWGs) and the five Coordinating Groups (CGs) that report to the Subcommittee and representatives from participating agencies
- The Subcommittee's Co-Chairs are the NCO Director and a NITRD agency Co-Chair (currently P. Freeman, NSF)

Program Component Areas (PCAs)

- The NITRD Program is organized in technical domains called Program Component Areas (PCAs)
- The NITRD Program currently has eight PCAs
- The activities in the PCAs are coordinated by Interagency Working Groups (IWGs) and Coordinating Groups (CGs)

NITRD Program Coordination



White House
Executive Office of the President

Office of Science and Technology Policy

U.S. Congress

NITRD Agency Authorization and Appropriations Legislation

President's Council of Advisors on Science and Technology (PCAST) serving as the **President's Information Technology Advisory Committee (PITAC)**

National Science and Technology Council

Committee on Technology

Committee on Homeland and National Security

National Coordination Office (NCO) for Networking and Information Technology Research and Development

Subcommittee on Networking and Information Technology Research and Development (NITRD)

Subcommittee on Infrastructure

High End Computing (HEC) Interagency Working Group

Cyber Security and Information Assurance (CSIA) Interagency Working Group

Large Scale Networking (LSN) Coordinating Group

High Confidence Software and Systems (HCSS) Coordinating Group

Human Computer Interaction and Information Management (HCI&IM) Coordinating Group

Software Design and Productivity (SDP) Coordinating Group

Social, Economic, and Workforce Implications of IT and IT Workforce Development (SEW) Coordinating Group

Program Component Areas (PCAs) and Interagency Working Groups (IWGs)

- **High End Computing (HEC) Interagency Working Group (IWG) coordinates two PCAs:**
  - HEC Infrastructure and Applications (I&A) – R&D to extend the state-of-the-art in computing systems, science and engineering applications, and data management
  - HEC Research and Development (R&D) – R&D to optimize the performance of today's high-end computing systems and to develop future generations of high-end computing systems
- **Cyber Security and Information Assurance (CSIA) Interagency Working Group (IWG) coordinates the CSIA PCA:**
  - R&D to improve the ability of information systems to prevent, resist, respond to, or recover from actions or events that compromise or threaten to compromise the availability, integrity, or confidentiality of data, of the information systems themselves, or of related information services

PCAs and Coordinating Groups (CGs)

- **Human Computer Interaction and Information Management (HCI&IM)**
  - R&D aimed at increasing the benefit of computer technology to humans through development of user interaction technologies, cognitive systems, information systems, and robotics
- **Large Scale Networking (LSN)**
  - R&D in leading-edge networking technologies, services, and techniques to enhance performance, security, and scalability, and in support of high performance research networks
- **Software Design and Productivity (SDP)**
  - R&D focused on achieving fundamental advances in concepts, methods, techniques, and tools for software design, development, and maintenance

PCAs and CGs (continued)

- **High Confidence Software and Systems (HCSS)**
  - R&D for technologies necessary to achieve affordable and predictable high levels of safety, security, reliability, and survivability in critical systems
- **Social, Economic, and Workforce Implications of IT and IT Workforce Development (SEW)**
  - R&D investigating the nature and dynamics of IT impacts on technical and social systems and interactions between people and IT devices and capabilities; workforce development; and innovative IT applications in education and training

Agency NITRD Budgets by PCA

FY 2006 Budget Requests (dollars in millions)

Agency	HEC I&A	HEC R&D	HCI&IM	LSN	HCSS	SDP	SEW	Totals
NSF	201.8	105.0	168.5	94.5	76.0	65.4	92.1	803
NIH	135.1	67.3	171.0	76.6	12.3	26.4	12.0	501
DOE/SC	105.7	82.0		36.2			3.5	227
DARPA		81.0	74.4	20.8				176
NSA		36.9		1.5	62.2			101
NASA	34.0		14.5	13.0	12.8			74
AHRQ			38.0	30.0				68
NIST	5.4	0.6	8.6	4.6	18.0	4.8		42
OSD					2.5	20.0		22
NOAA	13.7	1.8	0.5	2.8				20
EPA	3.3		3.0					6
Subtotals	**499.0**	**374.6**	**478.5**	**280.0**	**183.8**	**118.1**	**107.6**	**2041**
DOE /NNSA	33.1	30.5		14.3		31.6	4.4	114
Totals	**532.1**	**405.1**	**478.5**	**294.3**	**183.8**	**149.7**	**112.0**	**2155**

Introduction to the NITRD National Coordination Office

NITRD NCO Objectives

- Support NITRD policy making in the White House Office of Science and Technology Policy (OSTP)
- Serve as the Federal focal point for interagency technical planning, budget planning, and coordination for the NITRD Program
- Serve as a source of timely, high-quality, technically accurate, in-depth information on accomplishments, new directions, and critical challenges for the NITRD Program
- Disseminate knowledge about the impact of information technology R&D as a transforming force for governmental, societal, and economic good

Role of the NCO in NITRD Program Activities

- **The NCO helps the Interagency Working Groups and Coordinating Groups identify research needs, and plan, budget, and assess progress toward meeting those needs.**
- **Programs and activities take place at two levels:**
  - Government-only: interagency meetings
  - With external stakeholders: conferences and workshops involving academia and industry
- **Information dissemination takes place through published reports including:**
  - Annual Supplements to the President's Budget
  - Research needs reports
  - Conference and workshop reports
  - Reports of the President's Information Technology Advisory Committee (PITAC)

NCO Impact on NITRD Program Activities

- Improved NITRD interagency R&D coordination and planning activities
- More conferences, workshops, and meetings that aid in identifying NITRD needs in strategic areas that are aligned with and benefit national priorities
- Increased NITRD agency interaction and outreach with non-governmental experts to help identify NITRD needs and implement plans to address those needs
- Supported the creation and operation of Federal Agency Administration of Science and Technology Education and Research (FASTER), which addresses issues of interest to a broad range of Federal agencies such as business cases, return on investment, best practices, operational management, IT architecture issues, computer security on high performance research networks and in research facilities

Highlights of NCO/NITRD Activities

- Supported the planning and launching of a National Academies study to identify, in selected illustrative fields, important scientific questions and technological problems for which an extraordinary advancement in our understanding is difficult or impossible without leading-edge computation-intensive and/or data-intensive capabilities, and to categorize the numerical and algorithmic characteristics of the questions and problems
- Supported development of a Federal Plan for Cyber Security and Information Assurance (CSIA) R&D, and the integration of the CSIA PCA and its IWG into the NITRD Program
- Prepared the FY 2007 NITRD Supplement to the President's Budget
- Supported the IWGs and CGs in planning several national workshops

Recent NITRD Program Policy and Planning Activities

Policy Inputs to Interagency Planning

- FY 2007 Administration Research and Development Budget Priorities Memorandum
- Analytical Perspectives of the FY 2006 President's Budget
- PITAC reports
- Reports from other interagency entities
- Reports from agencies
- Reports from entities outside of the Federal government

Interagency Planning Activities: Research Needs Reports

- High Confidence Software and Systems Research Needs (January 2001)
- Workshop on New Visions for Large-Scale Networks: Research and Applications (March 2001)
- Workshop on New Visions for Software Design and Productivity: Research and Applications (February 2003)
- Human-Computer Interaction and Information Management Research Needs (October 2003)
- Grand Challenges: Science, Engineering, and Societal Advances Requiring Networking and Information Technology Research and Development (November 2003)

Interagency Planning Activities: Federal Plans

- **Federal Plan for High-End Computing (May 2004)**
  - Scope included HEC R&D, resources, and procurement
  - Process leading to development of report
    - Charge from OSTP
    - Chartering of the High-End Computing Revitalization Task Force
    - White papers and participation in a Computing Research Association workshop
- **Federal Plan for Cyber Security and Information Assurance Research and Development (forthcoming)**
  - Currently in NSTC review

Interagency Planning Activities: Workshops

- **Recent interagency planning workshops**
  - HCSS CG-sponsored Workshop on High Confidence Medical Device Software and Systems (June 2-3, 2005)
  - HEC IWG-sponsored Workshop on Storage and I/O Needs for High End Computing (August 16-17, 2005)
  - LSN CG-sponsored Optical Networking Testbed 2 (ONT2) Workshop (September 12-14, 2005)
- **Work underway for future workshops**
  - Cyber Security and Information Assurance
  - Aviation Safety: Flight Critical Systems
  - Critical Infrastructure Protection for the Power Grid
  - Information Integration
  - Software Interoperability

Discussion

For More Information:

- **Visit http://www.nitrd.gov/**
- **Send e-mail to nco@nitrd.gov**
- **Call us at (703) 292-4873**

Backup Slides

The 1997-2001 PITAC: Leadership

- **Co-Chairs (1997-1999)**
  - Bill Joy, Sun Microsystems
  - Ken Kennedy, Rice University
- **Co-Chairs (1999-2001)**
  - Raj Reddy, Carnegie Mellon University
  - Irving Wladawsky-Berger, IBM

The 1997-2001 PITAC: Membership

- **Members from academia and research institutions**
  - Ching-chih Chen, Simmons College
  - David Cooper, Lawrence Livermore National Laboratory
  - David Farber, University of Pennsylvania
  - Sherrilynne Fuller, University of Washington
  - Hector Garcia-Molina, Stanford University
  - Susan Graham, UC Berkeley
  - Robert Kahn, Corporation for National Research Initiatives
  - John Miller, Montana State University
  - Edward Shortliffe, Stanford University
  - Larry Smarr, University of Illinois, Urbana-Champaign
  - Joe Thompson, Mississippi State University

The 1997-2001 PITAC: Membership (continued)

- **Members from industry**
  - Eric Benhamou, 3Com
  - Vinton Cerf, MCI Worldcom
  - Steven Dorfman, Hughes Electronics
  - David Dorman, PointCast
  - Robert Ewald, Cray
  - James Gray, Microsoft
  - Daniel Hillis, Walt Disney Imagineering
  - David Nagel, AT&T Labs
  - Leslie Vadasz, Intel
  - Andrew Viterbi, QUALCOMM
  - Steve Wallach, CenterPoint Ventures

The 2003-2005 PITAC: Membership

- **Co-Chairs**
  - Marc Benioff, salesforce.com
  - Edward Lazowska, University of Washington
- **Members from academia**
  - Ruzena Bajcsy, UC Berkeley
  - José-Marie Griffiths, University of North Carolina
  - Judith Klavans, University of Maryland
  - Eli Noam, Columbia University
  - David Patterson, UC Berkeley
  - Daniel Reed, University of North Carolina
  - Gene Spafford, Purdue University
  - David Staelin, MIT

The 2003-2005 PITAC: Membership (continued)

- **Members from industry**
  - J. Carter Beese, Riggs Capital Partners
  - Pedro Celis, Microsoft
  - Patricia Thomas Evans, Global Systems Consulting Corporation
  - Manuel Fernandez, SI Ventures/Gartner
  - Luis Fiallo, Fiallo and Associates
  - William Hannigan, AT&T
  - Jonathan Javitt, Potomac Institute for Policy Studies
  - F. Thomson Leighton, Akamai
  - Harold Mortazavian, Advanced Scientific Research
  - Randy Mott, Dell Computer
  - Peter Neupert, Consultant
  - Alice Quintanilla, Information Assets Management
  - Peter Tippett, TruSecure
  - Geoffrey Yang, Redpoint Ventures

The 2003-2005 PITAC: Reports

Summary of Recommendations:

- **Revolutionizing Health Care Through Information Technology**
  - Revolutionize medical records systems in a framework that comprises
    - Electronic health records that support optimal care while reducing costs and administrative overhead
    - Computer-assisted clinical decision support
    - Computerized provider order entry
    - Secure, private interoperable, electronic health information interchange

The 2003-2005 PITAC: Reports

Summary of Recommendations:

- **Cyber Security: A Crisis of Prioritization**
  - Increase Federal funding for fundamental research in civilian cyber security
  - Increase the size of the cyber security research community
  - Strengthen technology transfer efforts
  - Improve coordination and oversight of Federal cyber security R&D

The 2003-2005 PITAC: Reports

Summary of Recommendations:

- **Computational Science: Ensuring America's Competitiveness**
  - Make coordinated, fundamental structural changes in universities and the Federal government's R&D agencies in order to address the 21st century's most important problems, which are predominantly multidisciplinary, multi-agency, multi-sector, and collaborative
  - Develop and execute a multi-decade roadmap directing coordinated advances in computational science and its applications in science and engineering
  - Provide and maintain software sustainability centers, national data and software repositories, and national high-end computing leadership centers, as well as with their interconnectivity with each other and with the researchers who use these resources
  - Fund long-term, balanced R&D investments in software, hardware, data, networking, and human resources